

Having thus defined the invention, the following is claimed:

1. In an electric arc welder operated to perform a short circuit welding process between an electrode and a workpiece, said process comprising a succession of alternate short circuit conditions and arc conditions, with a first waveform during said short circuit condition and a second waveform during said arc condition, a first waveform generator to construct said first waveform from a series of current pulses controlled by a pulse wave modulator operated at a rate greater than 18 kHz and a second waveform generator to construct said second waveform from a series of current pulses controlled by a pulse wave modulator operated at a rate greater than 18 kHz, the improvement comprising: said second waveform generator having a circuit to generate said second waveform with a generally constant arc parameter.

2. The improvement as defined in claim 1 whereas said parameter is arc current.

3. The improvement as defined in claim 1 wherein said parameter is arc voltage.

4. The improvement as defined in claim 1 wherein said parameter is arc power.

5. The improvement as defined in claim 4 including a voltage detector device with a circuit to sense the arc voltage between said electrode and said workpiece and a circuit to shift said weld process from said short circuit condition to said arc condition upon creation of an arc signal from said detector device when said sensed voltage is greater than a given value.

6. The improvement as defined in claim 5 wherein said welder includes a switch in series with said electrode and said workpiece, a resistor in parallel with said arc switch and a circuit to open said arc switch upon creation of said arc signal.

7. An improvement as defined in claim 6 including an inductor in series with said arc switch.

8. The improvement as defined in claim 3 including a voltage detector device with a circuit to sense the arc voltage between said electrode and said workpiece and a circuit to shift said weld process from said short circuit condition to said arc condition upon creation of an arc signal from said detector device when said sensed voltage is greater than a given value.

9. The improvement as defined in claim 8 wherein said welder includes a switch in series with said electrode and said workpiece, a resistor in parallel with said arc switch and a circuit to open said arc switch upon creation of said arc signal.

10. An improvement as defined in claim 9 including an inductor in series with said arc switch.

11. The improvement as defined in claim 2 including a voltage detector device with a circuit to sense the arc voltage between said electrode and said workpiece and a circuit to shift said weld process from said short circuit condition to said arc condition upon creation of an arc signal from said detector device when said sensed voltage is greater than a given value.

12. The improvement as defined in claim 11 wherein said welder includes a switch in series with said electrode and said workpiece, a resistor in parallel with said arc switch and a circuit to open said arc switch upon creation of said arc signal.

13. An improvement as defined in claim 12 including an inductor in series with said arc switch.

14. The improvement as defined in claim 1 including a voltage detector device with a circuit to sense the arc voltage between said electrode and said workpiece and a circuit to shift said weld process from said short circuit condition to said arc condition upon creation of an arc signal from said detector device when said sensed voltage is greater than a given value.

15. The improvement as defined in claim 14 wherein said welder includes a switch in series with said electrode and said workpiece, a resistor in parallel with said arc switch and a circuit to open said arc switch upon creation of said arc signal.

16. An improvement as defined in claim 15 including an inductor in series with said arc switch.

17. The improvement as defined in claim 16 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

18. The improvement as defined in claim 15 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

19. The improvement as defined in claim 13 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

20. The improvement as defined in claim 12 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

21. The improvement as defined in claim 10 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

22. The improvement as defined in claim 9 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

23. The improvement as defined in claim 7 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

24. The improvement as defined in claim 6 including a circuit for creating a neck signal upon an impending break in a short circuit during said short circuit condition and a circuit to override said arc signal by said neck signal.

25. The improvement as defined in claim 14 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

26. The improvement as defined in claim 7 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

27. The improvement as defined in claim 6 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

28. The improvement as defined in claim 5 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

29. The improvement as defined in claim 4 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

30. The improvement as defined in claim 3 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

31. The improvement as defined in claim 2 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

32. The improvement as defined in claim 1 wherein said first waveform is a current waveform with a first slope, a break point and then a second slope.

33 An electric arc welder operated to perform a short circuit welding process between an electrode and a workpiece, said process comprising a succession of alternate short circuit conditions and arc conditions, with a first current controlled waveform during said short circuit condition and a second voltage controlled waveform during said arc condition, a first waveform generator to construct said first waveform from a series of current pulses controlled by a pulse wave modulator operated at a rate greater than 18 kHz and a second waveform generator to construct said second waveform from a series of current pulses controlled by a pulse wave modulator operated at

a rate greater than 18 kHz, wherein said first waveform includes a first slope, a break point and then a second slope.

34. An electric arc welder as defined in claim 33 wherein said second waveform is constant current.

35. An electric arc welder as defined in claim 33 wherein said second waveform is constant voltage.

36. An electric arc welder as defined in claim 33 wherein said second waveform is constant power.

37. An electric arc welder as defined in claim 33 including a voltage detector device with a circuit to sense the arc voltage between said electrode and said workpiece and a circuit to shift said weld process from said short circuit condition to said arc condition upon creation of an arc signal from said detector device when said sensed voltage is greater than a given value.

38. An electric arc welder as defined in claim 37 wherein said welder includes a switch in series with said electrode and said workpiece, a resistor in parallel with said arc switch and a circuit to open said arc switch upon creation of said arc signal.

39. An electric arc welder as defined in claim 38 including an inductor in series with said arc switch.

40. An electric arc welder as defined in claim 37 including a break point circuit to manually adjust the current level of said break point in response to a control signal.

41. An electric arc welder as defined in claim 36 including a break point circuit to manually adjust the current level of said break point in response to a control signal.

42. An electric arc welder as defined in claim 35 including a break point circuit to manually adjust the current level of said break point in response to a control signal.

43. An electric arc welder as defined in claim 34 including a break point circuit to manually adjust the current level of said break point in response to a control signal.

44. An electric arc welder as defined in claim 33 including a break point circuit to manually adjust the current level of said break point in response to a control signal

45. An electric arc welder as defined in claim 44 wherein said break point circuit includes a circuit to create a voltage signal manually adjustable to change the voltage of said second waveform and a switch to apply said voltage signal as said control signal.



46. An electric arc welder as defined in claim 43 wherein said break point circuit includes a circuit to create a voltage signal manually adjustable to change the voltage of said second waveform and a switch to apply said voltage signal as said control signal.

47. An electric arc welder as defined in claim 42 wherein said break point circuit includes a circuit to create a voltage signal manually adjustable to change the voltage of said second waveform and a switch to apply said voltage signal as said control signal.

48. An electric arc welder as defined in claim 41 wherein said break point circuit includes a circuit to create a voltage signal manually adjustable to change the voltage of said second waveform and a switch to apply said voltage signal as said control signal.

49. An electric arc welder as defined in claim 40 wherein said break point circuit includes a circuit to create a voltage signal manually adjustable to change the voltage of said second waveform and a switch to apply said voltage signal as said control signal.

50. An electric arc welder operated to perform a short circuit welding process between an electrode and a workpiece, said process comprising a succession of alternate short circuit conditions and arc conditions, with a first current controlled waveform during said short circuit condition, a first waveform generator to construct said first waveform from a series of current pulses controlled by a pulse wave modulator operated at a rate greater than 18 kHz, wherein said first waveform includes a first slope, a break point and then a second slope, and a break point circuit to

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set the current of said break point in response to an input signal, a first manually adjustable input signal for said break point circuit, a second manually adjustable input signal for said break point circuit and a switch to connect one of said input signals to said break point circuit.

51. An electric arc welder as defined in claim 50 wherein said second manually adjustable input circuit is a parameter adjusting circuit of said welder.

52. An electric arc welder as defined in claim 51 wherein said parameter is the voltage of said welder.